

What is Claimed is:

1 1. A method of determining a location of an impact of a projectile upon a target
2 space comprising:

3 (a) receiving projectile impacts upon an impact device surface, wherein said
4 impact device includes a plurality of layers, and wherein at least one of the plurality of layers
5 includes an electrically conducting sensor layer with at least one electrical property that
6 changes in response to the impact from the projectile; and

7 (b) monitoring the sensor layer of the impact device and determining a location of
8 the projectile impact upon the impact device surface.

1 2. The method of claim 1, wherein step (a) further includes:

2 (a.1) applying an electrical signal of known magnitude across the sensor layer.

1 3. The method of claim 1, wherein step (b) further includes:

2 (b.1) measuring the electrical property at a plurality of measurement locations upon
3 the sensor layer to establish a reference measurement for each of said plurality of
4 measurement locations.

1 4. The method of claim 3, wherein step (b) further includes:

2 (b.2) sampling the electrical property at said plurality of measurement locations to
3 obtain a sample measurement at each of said plurality of measurement locations and
4 comparing each of the sample measurements to a corresponding reference measurement to
5 determine a deviation from the corresponding reference measurement.

1 5. The method of claim 4, wherein step (b) further includes:

2 (b.3) determining the impact location of the projectile upon the impact device based
3 upon the determined electrical property deviations.

1 6. The method of claim 1, wherein the impact device is physically aligned with a
2 target space corresponding to at least one of a physical target and a generated virtual target,

3 and step (b) further includes:

4 (b.1) correlating the impact device with the target space by associating at least one
5 location upon the impact device with at least one corresponding location within the target
6 space.

1 7. The method of claim 1, wherein the impact device is transparent and the
2 impact device is aligned in front of the target space.

1 8. The method of claim 1, wherein the impact device is opaque and the impact
2 device is aligned behind the target space.

1 9. The method of claim 1, further including:

2 (c) displaying at least one of a score value, an elapsed time between projectile
3 impacts and an impact location on a target image.

1 10. The method of claim 1, wherein step (b) further includes:

2 (b.1) calibrating the determined impact location to account for environmental
3 conditions.

1 11. The method of claim 5, wherein step (b.3) further includes:

2 (b.3.1) processing the deviations in accordance with electronically stored instructions.

1 12. The method of claim 4, wherein step (b.2) further includes:

2 (b.2.1) comparing the determined deviation to a pre-defined threshold value; and

3 (b.2.2) determining the presence of a projectile impact in response to the determined
4 deviation exceeding the pre-defined threshold value.

1 13. The method of claim 1, wherein said at least one electrical property includes
2 the resistance of the sensor layer.

1 14. The method of claim 1, wherein said at least one electrical property includes

2 the capacitance of the sensor layer.

1 15. The method of claim 1, wherein step (a) further includes:

2 (a.1) calibrating the impact device by impacting the impact device surface at a
3 location physically adjacent to a predefined location within the target space.

1 16. A target assembly for determining a location of an impact of a projectile upon
2 a target space, the target assembly comprising:

3 an impact device to receive a projectile impact upon a surface thereof, wherein the
4 impact device includes a plurality of layers, and wherein at least one of the plurality of layers
5 includes an electrically conducting sensor layer with at least one electrical property that
6 changes in response to the impact from the projectile; and

7 a monitoring module to monitor the sensor layer of the impact device and determine a
8 location of the projectile impact upon the impact device surface.

1 17. The target assembly of claim 16, wherein the monitoring module further
2 includes:

3 a sensor power module to apply an electrical signal of known magnitude across the
4 sensor layer.

1 18. The target assembly of claim 16, wherein the monitoring module further
2 includes:

3 a reference module to measure the electrical property at a plurality of measurement
4 locations upon the sensor layer to establish a reference measurement for each of said plurality
5 of measurement locations.

1 19. The target assembly of claim 18, wherein the monitoring module further
2 includes:

3 a sampling module to sample the electrical property at said plurality of measurement
4 locations to obtain a sample measurement at each of said plurality of measurement locations
5 and to compare each of the sample measurements to a corresponding reference measurement

6 to determine a deviation from the corresponding reference measurement.

1 20. The target assembly of claim 19, wherein the monitoring module further
2 includes:

3 an assessment module to determine the location of the projectile impact upon the
4 impact device surface based upon the determined electrical property deviations.

1 21. The target assembly of claim 16, wherein said monitoring module includes:
2 a controller module to receive the impact location information from the monitoring
3 module and determine a location of impact upon a target space that is aligned with said
4 impact device.

1 22. The target assembly of claim 21, wherein the impact device is physically
2 aligned with a target space defined by at least one of a physical target and a generated virtual
3 target, and wherein the controller module further includes:

4 a correlation module to correlate the impact device with the target space by
5 associating at least one location upon the impact device with at least one corresponding
6 location within the target space.

1 23. The target assembly of claim 16, wherein the impact device is transparent.

1 24. The target assembly of claim 16, wherein the target assembly further includes:
2 a display interface to communicate with at least one of an external display and a
3 computer system to display at least one of a score value, an elapsed time between projectile
4 impacts and an impact location on a target image.

1 25. The target assembly of claim 21, wherein the controller module further
2 includes:

3 a calibration module to calibrate the determined impact location to account for
4 environmental conditions.

1 26. The target assembly of claim 16, wherein the target assembly further includes:
2 a memory module that stores electronic processing instructions.

1 27. The target assembly of claim 19, wherein the monitoring module further
2 includes:
3 a threshold module to compare a determined deviation to a pre-defined threshold
4 value to determine the presence of a projectile impact in response to the deviation exceeding
5 a pre-defined threshold value.

1 28. The target assembly of claim 16, wherein said at least one electrical property
2 includes the resistance of the sensor layer.

1 29. The target assembly of claim 16, wherein said at least one electrical property
2 includes the capacitance of the sensor layer.